Design Brief for Hillside Escalator
Links and Elevator Systems at Hong Kong West
CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Objectives</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Project Schedule</td>
<td>1</td>
</tr>
<tr>
<td>2. PROJECT DESCRIPTION</td>
<td>2</td>
</tr>
<tr>
<td>2.1 Background</td>
<td>2</td>
</tr>
<tr>
<td>2.2 Proposed Development</td>
<td>3</td>
</tr>
<tr>
<td>2.3 General Ground Condition</td>
<td>3</td>
</tr>
<tr>
<td>3. CLIENT’S REQUIREMENTS</td>
<td>3</td>
</tr>
<tr>
<td>4. SCOPE OF WORKS</td>
<td>3</td>
</tr>
<tr>
<td>4.1 Regular progress updates</td>
<td>3</td>
</tr>
<tr>
<td>4.2 Inception Report</td>
<td>4</td>
</tr>
<tr>
<td>4.3 Report on Feasibility Study and Preliminary Design</td>
<td>4</td>
</tr>
<tr>
<td>4.4 Report on Detailed Design</td>
<td>5</td>
</tr>
<tr>
<td>4.5 Poster</td>
<td>5</td>
</tr>
<tr>
<td>5. SITE VISITS</td>
<td>6</td>
</tr>
<tr>
<td>6. RECOMMENDED DESIGN STANDARDS AND REFERENCES</td>
<td>6</td>
</tr>
<tr>
<td>7. COMMONLY USED DESIGN SOFTWARES</td>
<td>6</td>
</tr>
</tbody>
</table>

Appendix  Reference Drawings
1. **INTRODUCTION**

1.1 **Objectives**

The objective of this capstone design project is to provide professional training to final year students to work on civil engineering projects through synergistic teamwork within a realistic working environment. Students are required to participate in the conceptual formulation of general arrangement, foundation and structural schemes, appraisal of the schemes and construction sequence, as well as traffic impact assessment, environmental impact assessment, and drainage impact assessment where appropriate, followed by preliminary design, preparation of drawings/figures, preliminary cost estimation for the selected scheme in the first semester and also preparation of drawings and calculations for detailed design in the second semester.

1.2 **Project Schedule**

The schedule of the design project is set out in Table 1 below.

<table>
<thead>
<tr>
<th>Milestone Date</th>
<th>Component</th>
<th>Page Limit</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 Sep 2020 (Wed) by 5pm</td>
<td>Inception report</td>
<td>30</td>
<td>10%</td>
</tr>
<tr>
<td>21 Oct 2020 (Wed) by 5pm</td>
<td>Regular progress update 1</td>
<td>-</td>
<td>*a&amp;c</td>
</tr>
<tr>
<td>20 Nov 2020 (Fri) by 5pm</td>
<td>Draft report on feasibility study and preliminary design</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>27/28 Nov 2020 (Fri/Sat)</td>
<td>Oral presentation 1</td>
<td>-</td>
<td>10%</td>
</tr>
<tr>
<td>8 Jan 2021 (Fri) by 5pm</td>
<td>Report on feasibility study and preliminary design</td>
<td>100</td>
<td>25% *a</td>
</tr>
<tr>
<td>15 Jan 2021 (Fri) by 5pm</td>
<td>Poster</td>
<td>-</td>
<td>*a</td>
</tr>
<tr>
<td></td>
<td>Peer review</td>
<td>-</td>
<td>*b</td>
</tr>
<tr>
<td>24 Feb 2021 (Wed) by 5pm</td>
<td>Regular progress update 2</td>
<td>-</td>
<td>*a&amp;c</td>
</tr>
<tr>
<td>16 Apr 2021 (Fri) by 5pm</td>
<td>Draft report on detailed design</td>
<td>100 (excl. calculations)</td>
<td>-</td>
</tr>
<tr>
<td>23/24 Apr 2021 (Fri/Sat)</td>
<td>Oral presentation 2</td>
<td>-</td>
<td>10%</td>
</tr>
<tr>
<td>30 Apr 2021 (Wed) by 5pm</td>
<td>Report on detailed design</td>
<td>100 (excl. calculations)</td>
<td>25% *a</td>
</tr>
<tr>
<td>3 May 2021 (Mon) by 5pm</td>
<td>Poster</td>
<td>-</td>
<td>*a</td>
</tr>
<tr>
<td></td>
<td>Peer review</td>
<td>-</td>
<td>*b</td>
</tr>
<tr>
<td>See Moodle</td>
<td>Seminar reports</td>
<td>-</td>
<td>20%</td>
</tr>
</tbody>
</table>

* Notes:
  a. The report on feasibility study and preliminary design or the report on detailed design is assessed together with regular progress updates and posters by staff tutors and moderators and progress meetings by industrial tutors in the same semester. It is also used for mark adjustment of the report in the same period among various groups working on the same
project. The assessment results of various reports posted on Moodle are therefore tentative only and subject to subsequent adjustments.

b. Peer review is used for possible adjustment of individual marks among group members at the discretion of staff tutor and moderator for report on feasibility study and preliminary design or detailed design.

c. Students are required to report their progress regularly by posting the agenda and minutes of meetings and updates to project file on their Moodle website. The staff tutor and moderator will provide feedback and carry out assessment accordingly.

d. Students are required to attend regular progress meetings to report their progress and to consult the industrial tutors and staff tutors/moderators for advice. The detailed schedule is shown in the course arrangement.

2. PROJECT DESCRIPTION

2.1 Background

The north shore of Hong Kong Island is highly developed and densely populated. Nevertheless, the steep topography presents significant challenge to pedestrian connectivity. The above challenge was partially overcome with the opening of the Central to Mid-Levels escalator and walkway system, which provides an efficient and effective pedestrian link between Queen’s Road Central and Conduit Road. More recently, a similar system was put into service at Centre Street, providing a convenient link between Queen’s Road West and Bonham Road for pedestrians.

The Government have long had the intention to enhance the accessibility of hillside areas with the provision of hillside escalator links and elevator systems (HEL). In a paper submitted to the Legislative Council in November 2019 (LegCo Paper No. CB(4)105/19-20(01), the Transport Department advised that a number of proposals were being studied, including the following proposals to connect Bonham Road with Conduit Road:

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Name of HEL Proposal</th>
<th>Preliminary Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>HKI01</td>
<td>Extension of Centre Street Escalator from Bonham Road to Conduit Road (Proposal A for the purpose of this project)</td>
<td>From Park Road near Oaklands Path to Conduit Road</td>
</tr>
<tr>
<td>HKI10</td>
<td>Extension of the proposed Pound Lane Escalator from Bonham Road to Conduit Road (Proposal B for the purpose of this project)</td>
<td>From Bonham Road near Bonham Court to Conduit Road</td>
</tr>
</tbody>
</table>

In the same paper, Transport Department also advised that it would be necessary to establish priority amongst the proposals under consideration. The above paper puts forward a scoring system to prioritize proposals which satisfy the criteria of an initial screening process. The scoring system presented in the LegCo Paper No. CB(4)105/19-20(01) was built up on the basis of a ranking system developed in a consultancy study commissioned by the Transport Department in May 2008 (referred to as “the former assessment mechanism” in the said LegCo paper).
References:
LegCo Paper No. CB(4)105/19-20(01):
The executive summary of the consultancy study on hillside escalator ranking system:

2.2 Proposed Development
The feasibility of both Proposals A and B should be assessed. If both proposals are considered to be feasible, a cost benefit analysis should then be carried out to recommend the more beneficial proposal for priority implementation (please refer to the scoring system discussed in LegCo Paper No. CB(4)105/19-20(01) to build up a suitable assessment methodology for this study). A feasible scheme, including but not be limited to alignment and locations of associated escalators, walkways and/or elevators should be proposed with justification to substantiate the recommended proposal. Preliminary construction planning, architectural and structural layout, public liaison, impact on existing buildings, environmental, traffic, utilities, etc., should be considered.

2.3 General Ground Condition
The ground information of the site can be retrieved at Geotechnical Information Unit, Civil Engineering Library, LG1 of Civil Engineering and Development Building. The highest possible ground water level is taken as the ground surface.

3. CLIENT’S REQUIREMENTS
The project team shall conduct, but not limited to, the following engineering tasks: -

a. Study the feasibility of Proposals A and B and recommend the more beneficial proposal and outline the alignment for the hillside escalator links and elevator systems to connect Bonham Road with Conduit Road;

b. Design the structure of the proposed hillside escalator links and elevator systems;

c. No adverse effects on adjacent roads and structures and underground structure should be incurred due to the development during construction and operation stages;

d. Temporary traffic arrangement is required throughout the construction period; and

e. Provide construction method with graphical illustration.

4. SCOPE OF WORKS
4.1 Regular progress updates
The regular progress updates shall comprise:

a. Meeting records (40%) - agenda and minutes of meetings

b. Project file (60%) - it shall contain sufficient information to describe the evolution of the design, e.g. brief descriptions, scanned copies of free-hand sketches of various schemes, rough calculations, etc. for illustration.
It is understood that, while the design scheme is still evolving, not all of the design requirements will be met. The design scheme may also be revised in the process. Therefore, assessment of the regular update is based on the progress made rather than feasibility of design scheme. The feasibility of design scheme will be assessed with submission of the final reports.

### 4.2 Inception report

a. The project team shall identify all the site constraints and the particular concerns as far as possible in environmental, geotechnical, structural, drainage, transportation and constructability aspects.

b. The project team shall present the methodology for assessment of the technical feasibility of Proposals A and B.

c. If both Proposals A and B are considered to be technically feasible, the project team shall present the methodology to identify the more beneficial proposal for the hillside escalator links and elevator systems to connect Bonham Road with Conduit Road.

d. The project team shall report the progress of any work done.

e. The project team shall develop a working plan and identify important milestones of the project with proposed dates.

f. A task list and a duty roster indicating the apportionment of tasks among project team members shall be included in the report.

### 4.3 Report on feasibility study and preliminary design

a. The project team shall develop a feasible scheme for the hillside escalator links and elevator systems. The design scheme shall satisfy the Client’s requirements as set out in this brief.

b. Due considerations shall be given to the suitability, construction programme, cost, material, environment and safety.

c. The project team shall submit a report on feasibility study and preliminary design which includes, but not limited to, the following details: -

   - The scope, purpose and background of the study;
   - An executive summary of the study;
   - Engineering considerations including consideration of different options;
   - A preliminary assessment of traffic, drainage, environmental and visual impact, etc.;
   - Development and evaluation of alternative design solutions;
   - Cost benefit analysis to identify the more beneficial proposal;
   - Schematic plans and sections showing viable structural and foundation layouts;
   - Recommendation, with sound engineering justifications, of a feasible alignment and locations of associated escalators and elevators;
   - Proposed project schedule for implementation;
   - Estimates of costs;
   - A project file including all letters, minutes, agenda, etc. in the Appendix; and
   - A task list and a duty roster indicating the apportionment of tasks among project team members.

   d. The project team shall produce drawings showing the preliminary design of the hillside escalator links and elevator systems. These include, but are not limited to, the following:

      - General layout plan that also shows the location of the hillside escalator links and elevator systems;
- General structural plans; and
- Foundation layout plans and sections with geological profile.

e. The project team shall deliver a 45-min. oral presentation at the end of the feasibility study and preliminary design followed by a 15-min. question and answer session. The schedule shall refer to the course arrangement. The presentation shall set out design considerations and illustrate key findings of the feasibility study and preliminary design. The recommendation and justification for the preferred scheme shall be fully covered in the presentation for the Client’s agreement.

f. The project team shall also prepare a poster which includes the most important findings of your feasibility study and preliminary design. Format of the poster shall refer to Section 4.5.

### 4.4 Report on detailed design

a. The project team shall prepare a detailed design report for submission to the client. The final design report shall include, inter alia, the following items: -
   - An executive summary;
   - Design memorandum including design criteria, geotechnical parameters, loading schedule, safety, standard codes, etc.;
   - A general description of the proposed works and construction sequences;
   - Layout, sections and elevations of the hillside escalator links and elevator systems;
   - Structural design calculation for key structural elements only;
   - Impact assessment reports for structure, traffic, drainage and environmental;
   - A risk assessment of the project;
   - Construction method;
   - Overall construction programme and cost estimation;
   - A project file including all letters, minutes, agenda, etc. in the Appendix; and
   - A task list and a duty roster indicating the apportionment of tasks among project team members.

b. The project team shall produce drawings for the hillside escalator links and elevator systems. These include, but are not limited to, the following: -
   - General layout plan that also shows the location of the hillside escalator links and elevator systems;
   - General structural design for key structural elements with reinforcement (for reinforced concrete structures) and connection (for steelworks) details;
   - Foundation layout plans and sections with geological profile;
   - Construction sequences of the structures; and
   - Traffic diversion plan.

c. The project team shall deliver a 45-min. presentation at the end of the final detailed design and the schedule shall refer to the course arrangement. The presentation shall be followed by a 15-min. question and answer session.

d. The project team shall also prepare a poster which includes the most important elements of the detailed design. Format of the poster shall refer to Section 4.5.

### 4.5 Poster

Each group shall submit a poster after the two milestones (feasibility study and preliminary design and detailed design). The use of posters is quite common in design competitions,
research conferences, exhibitions, public engagement, etc. For the Capstone Design Project, the 10 groups who are working on the same project are similar to 10 consultant firms competing for an engineering job. The judging panel would be your client and relevant experts. Posters shall include the most important findings of your report and they are used for mark adjustment of the report in the same period among various groups working on the same project.

Students shall use Microsoft PowerPoint or equivalent to design the poster with the following requirements.

a. Size - A1 (594 × 841 mm)
b. Image resolution: 300 dpi
c. Main Title: recommended font size between 54 to 60 pt
d. Sub-heading: recommended font size between 40 to 44 pt
e. Normal text: recommended font size of at least 28 pt

5. SITE VISITS

In order to familiarize with the site conditions, site visits to the proposed development shall be arranged in the early design stage, if necessary.

6. RECOMMENDED DESIGN STANDARDS AND REFERENCES

The following codes of practice, standards and references shall be used in the design of the development as applicable:

a. Hong Kong Buildings Ordinance, Chapter 123
b. Hong Kong Building (Construction) Regulation 1990.
d. Code of Practice for the Structural Use of Concrete 2013, Buildings Department.
e. Code of Practice for the Structural Use of Steel 2011, Buildings Department.
h. Code of Practice for Dead and Imposed Loads 2011, Buildings Department.
i. Code of Practice for Site Supervision 2009, Buildings Department.
n. Guide to Site Investigation, GEOGUIDE 2, 1987
q. Highways Department Standard Drawings.
s. Transport Planning and Design Manual.
t. Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers (PNAP), Buildings Department.

7. COMMONLY USED DESIGN SOFTWARES
The following design software are commonly used in the industry:

a. ANSYS – structural analysis
b. ETABS – structural analysis
c. FREW – geotechnical analysis of deformation and stability of soil structures
d. MIDAS – structural analysis
e. PLAXIS – geotechnical analysis of deformation and stability of soil structures
f. REVIT – Building Information Modeling
g. PROKON – structural element design
h. SADS – structural element design
i. SAFE – analysis and design for concrete slabs and basement/foundation structures
j. SAP 2000 – structural analysis
k. SPACE GASS – structural analysis
l. STAAD Pro – structural analysis
m. STRAND7 – structural analysis
Appendix – Reference Drawings
工務計劃第765CL號 - 安達臣道石礦場用地發展 - 餘下行人連繫設施工程
PWP ITEM No. 765CL - DEVELOPMENT OF ANDERSON ROAD QUARRY SITE
- REMAINING PEDESTRIAN CONNECTIVITY FACILITIES WORKS
工務計劃第765CL號 - 安達臣道石礦場用地發展 - 餘下行人連繫設施工程
PWP ITEM No. 765CL - DEVELOPMENT OF ANDERSON ROAD QUARRY SITE
- REMAINING PEDESTRIAN CONNECTIVITY FACILITIES WORKS